



Department of Energy

ALBUQUERQUE OPERATIONS
ROCKY FLATS AREA OFFICE
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710 881 Hillside RI
Final Draft

3020-17-04

Mr David C Shelton
Director, Hazardous Materials
and Waste Management Division
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

Mr Robert L. Duprey
Director, Waste Management Division
U S Environmental Protection Agency, Region VIII
999 18th Street
Denver Place, Suite 500 WM-C
Denver, Colorado 80202-2405

Gentlemen

The Remedial Investigation Report for the high priority sites (881 Hillside area) has been completed. This Remedial Investigation Report contains results of additional drilling performed in 1987 and responses to the Colorado Department of Health and the Environmental Protection Agency comments received on a draft Remedial Investigation Report submitted to you in July of 1987. In addition to the report, a list of the response is presented for each comment made by the EPA and the CDH. This list is attached as a document separate to the Remedial Investigation Report.

This Remedial Investigation Report is being submitted for your comments as a "Draft Final" in accordance with EPA preferred terminology.

Questions regarding the Remedial Investigation Report may be directed to Ms Candice Jierree at 303-966-2646.

Sincerely,

W Clark
William C. Rask, Chief
Operations Branch

Attachment

cc

K B McKinley, Rockwell

REVIEWED FOR CLASSIFICATION/UCNI

By F J Curran

Date 4-1-91

ADMIN RECORD

A-DU01-000108

**REPLY TO COLORADO DEPARTMENT OF HEALTH COMMENTS
ON DRAFT 881 HILLSIDE RI REPORT**

1.1 Objectives and Scope

Comment The report discusses the results of the Remedial Investigation of the 881 Hillside High Priority Site and not of all the priority sites

Response The High Priority Sites at Rocky Flats Plant are those Solid Waste Management Units (SWMUs) located within the 881 Hillside Area. This concept will be clarified in the RI text.

Comment The report should conclude with a description of the plume of contamination including cross sections and plan maps sufficient to show the vertical and horizontal extent of the plume, its effect on the surface water and groundwater quality, and the ultimate effect of the plume on human health and the environment.

Response The report should conclude as described in this comment. However, results should be presented in the Executive Summary and in the Public Health and Environmental Concerns sections and not in the Introduction.

1.2 Site Background Information

Comment A larger-scale map illustrating the buffer zone around the plant operations should be included for orientation and reference.

Response Appropriate maps or figures will be added to the final report to better illustrate buffer zone and study area locations within Rocky Flats Plant.

1.3 Nature and Extent of the Problem

Comment This section provides general background for the CEARP Phase II site specific monitoring plan and is not specific to the 881 Hillside. The reasons for prioritizing the 881 Hillside and the past disposal practices are presented. However, the nature and extent of the contamination problem at the 881 Hillside are not addressed.

Response This section will be revised to address the nature and extent of contamination resulting from sites at the 881 Hillside.

1.4 Previous Investigations

Comment Concise descriptions of the conclusions and/or results of the previous investigations should be provided. The order of the different pathways is not consistent with that of the chapters covering each of the different pathways.

Response This section will be reorganized so the three pathways (ground water, surface water, and air) are discussed in a consistent order throughout the RI report. Concise summaries of the conclusions and/or results of previous investigations will be provided for each pathway.

1.4.1 Air Pathway

Comment The section should briefly characterize the air pathway, its potential for contaminant migration, and include a concise history of past contamination.

Response This section will be revised to include a characterization of the air pathway and to summarize results of past air pathway investigations

1 4 2 Surface Water Pathway

Comment A map, at an appropriate scale, illustrating the surface water flow patterns and sources of contamination at the 881 Hillside should be provided Figure 2-3 shows the drainage patterns of the region but is not specific to the 881 Hillside

Response The surface water pathway discussion will be revised to relate surface water patterns at the 881 Hillside to those at Rocky Flats Plant, and appropriate figures will be provided

1 4 3 Ground-water Pathway

Comment The text is not specific to the 881 Hillside As in sections 1 4 1 and 1 4 2, a brief characterization of the pathway should be included

Response This section will be revised to include a brief characterization of the ground-water pathway based on previous investigations

1 5 Remedial Investigation Summary

Comment The appropriate section, figure, or plate, for the nine items listed, should be referenced

Response Appropriate references will be provided

16 Overview of Report

Comment This section provides a concise and informative description of the report outline and would be more effective if presented toward the beginning of Chapter 1 rather than at the end. It is somewhat repetitive of Section 1.1 and perhaps the two sections could be combined.

Response The Introduction chapter has been reorganized to first provide a report overview and then proceed with site locations and descriptions, previous investigations, nature and extent of the problem, and conclude with a remedial investigation summary (Section 2.0). The topic of each section will be discussed on a site-specific basis.

CHAPTER 2 - REGIONAL SETTING AND SITE FEATURES

2.1 Demography

Comment Reference to Figure 2-1 should be made in the first paragraph
Figure 2-1 does not show the county lines

Response Figure 2-1 has been revised to show county lines and will be
referenced as Figure 3-1

2.2 Land Use

Comment This section should mention the railroad and roads around the
plant and their frequency of use

Response Railroads and roads around Rocky Flats Plant and their frequency
of use will be discussed in the final report

2.3 Natural Resources

Comment Is this section pertinent to the evaluation of the 881 Hillside
contamination? If the section does not relate, then it is not a necessary part of the
report

Response This section is provided in accordance with EPA guidance on
remedial investigation reports (EPA, 1985)

2 4 Climatology

Comment The last sentence in the section needs clarification. A statement on the effects of the climatic conditions on potential contaminant migration should be included.

Response Insufficient data are available to assess the effects of the climatic conditions on potential contaminant migration.

2 5 Physiography

Comment For completeness, all the major stratigraphic units exposed in the area should be included in the general geologic description and not just the Dakota Sandstone and Fountain Formation.

Response Section 3 5 discusses physiography of the Front Range. Thus, the Dakota Sandstone and Fountain Formation are mentioned as resistant hogbacks along the Front Range. A figure will be added to this section to show the less resistant bedrock units and their relationship to physiography. However, descriptions of all Paleozoic and Mesozoic units are presented in the regional geology section and shown on a stratigraphic section in Section 2 6.

2 6 Geology and Soils

2 6.2 Geology

Comment The section lacks a complete description of the local geology. This should be provided or reference should be made to previous studies. Maps illustrating

the geologic features (structure and stratigraphy) described would be informative. The units overlying the Fountain Formation should be listed (in order of decreasing age) and not referred to as various units.

Response This section will be expanded to discuss the regional geology of the Denver Basin and the geologic setting of Rocky Flats Plant. Site-specific geologic data from investigations in the 881 Hillside Area will be presented in Chapter 40 (Site Hydrogeology). Each formation present in the vicinity of Rocky Flats Plant will be discussed in the Regional Setting section. These formations are currently described in Figure 2-2 (Generalized Stratigraphic Section, Golden-Morrison Area). Appropriate maps and figures will be added to this section to illustrate the regional geologic setting of the 881 Hillside Area and Rocky Flats Plant.

Comment The stratigraphic description of the Upper Laramie Formation and Arapahoe Formation should be more detailed. The description should include the grain sizes, the origin of the clay and sand layers, the location of the sand layers within the clay layers, the size, shape, and orientation of the sand layers, etc.

Response Geologic descriptions of the Upper Laramie Formation and the Arapahoe Formation will be revised, and Plant-specific details of their lithologies, depositional history, and structure will be added to the discussion.

Comment. The discussion of the structure is too general. The fault patterns should be illustrated on a map to show their relationship to the facility. Cross section A-A' (Plate 4-3) shows a fracture zone in the Arapahoe Formation. Fracture zones are not described in the text. Their occurrence, extent, origin, and effect on the site hydrology must be described.

Response A section on regional bedrock structure will be added to the regional setting discussion which will provide more detail on structure and faulting in the vicinity of Rocky Flats Plant. Maps and/or figure will be provided to show faults in the vicinity of the Plant. Fracture zones and other structural features encountered during drilling at the 881 Hillside will be discussed in detail in Section 4.0 (Site Hydrogeology).

Comment The geologic map (Plate 4-2) does not show the sandstone lenses in the Arapahoe Formation. Is the detail of mapping adequate to show sandstone lenses in the area? If so, include them on the map. Plate E-2 of the Part B permit application indicates that sandstone lenses are present in the 881 Hillside Area.

Response No subcropping or outcropping sandstones have been identified at the 881 Hillside Area.

2.6.2 Soils

Comment A stratigraphic column of the surficial deposits would be helpful. The descriptions of the surficial deposits must be more detailed. If distinct layers are present then they should be described individually (i.e. the gravel layer at the base of the colluvium as mentioned in Chapter 3). In general, detailed mapping of the surficial deposits is necessary. The hummocky topography underlying the facility is indicative of localized landslides and slumping. These features must be distinguished on the geologic map and the effects of such features on the hydrology must be addressed. Reference is made in CEARP Phase I (p. III-5) to the occurrence of landslides and creep in the colluvium due to the contact angle between the Arapahoe

Formation and colluvium and to lubrication along the contact by water infiltrating the colluvium

Response A stratigraphic column and cross sections of surficial deposits in the vicinity of Rocky Flats Plant will be provided in this regional setting section. Surficial deposits and features specific to the 881 Hillside Area will be discussed in Section 4.0 (Site Hydrogeology). No landslides or slump features were identified during either the 1986 initial Phase II site characterization (Rockwell International, 1986) or during Remedial Investigation field activities at the 881 Hillside, although these features are present in other areas of the Plant. The hummocky topography along the 881 Hillside is believed to be caused by disturbance of surficial materials in the area during past construction and waste disposal activities. Quaternary terraces younger than the Rocky Flats Alluvium may also underlie some of the hummocky terrain. Additional investigations are currently in progress to verify these interpretations; results of these studies will be presented in the final RI report.

2.7 Water Resources

Comment: The following items are mentioned in the text but are not shown in Figure 2-3: Upper Church Lake, Standley Lake, Ralston Reservoir, and Kinnear Ditch and Reservoir. Mower Reservoir receives water from Woman Creek (Figure 2-3) but is not mentioned in the text. All local water bodies that may be affected by plant operations must be mentioned.

Response Figure 2-3 will be revised to show the surface water bodies mentioned, and Mower Reservoir will be discussed in the text to clarify regional surface water drainage patterns.

Comment The use of off-site wells in the Laramie-Fox Hills, Arapahoe, and Rocky Flats aquifers should be addressed. Information should include any effect plant operations have on the groundwater quality (see comments on Section 8.1.3).

Response A subsection on regional ground-water use will be added to this section to address the use of off-site wells.

CHAPTER 3 - CHARACTERIZATION OF WASTE SOURCES

Comment More detail on the establishment of background must be provided. Background values (standards) for all parameters listed in Table 3-1 should be given in Table 3-2. A list of detection limits for these parameters and the geologic units sampled must also be provided.

Response The available of background metals and radionuclide concentrations in the soils are presented in Table 4-3. Background values for volatile organics and semi-volatile organics are assumed to be zero.

Comment Paragraph 3 indicates that at the time of writing, sample data was not complete. The conclusions made in the RI are then considered preliminary until all data is available and interpreted. Soil sample locations should be shown on a map.

Response Sample data were not complete at the time of writing the draft RI report, and conclusions were preliminary. Soil sample locations are shown on Plate 4-1 of the draft RI report. The appropriate figure or plate will be referenced.

Comment Do the revised SWMU locations include both the source and plume of contamination? Explain reasons for the revision of the SWMU locations.

Response Rationale for revision of SWMU locations will be provided, and source contamination will be differentiated from contaminant plumes where possible.

3.1 SWMU 102

Comment It is possible that the proposed location of the site is not correct and that BH6-87 is too far from the source to conclude that SWMU 102 is not a source of contamination

Response The proposed location of SWMU 102 will be reviewed prior to submission of the final RI report. The mislocation of a SWMU does not preclude it being a source of contamination.

Comment Southeast of BH6-87 in the drainage which cuts through SWMU 102, the TCE level was 1,541. Is this related to the SWMU 102 site?

Response This comment presumably refers to the PCE molecular count of 1,541 in the soil gas southeast of BH6-87. BH6-87 was located as close as possible to this soil gas point, however, the precise location could not be accessed by a drill rig. The relationship between this isolated soil gas hit and SWMU 102 is unknown at this time, but the question will be addressed in the final report.

3.2 SWMU 103

Comment This section lacks a conclusion.

Response A concluding summary is provided at the end of each chapter in the final report.

Comment It is difficult to check the sample analyses given in the section with those listed in Appendix E-1. The appendix needs a table of contents so that the

sample data can be easily referenced while reading the entire report (See comments on Appendix E)

Response Appendix F has been reorganized and indexed for easier reference

3.3 SWMU 104

Comment Sample results from BH7-87 indicate that a plume has migrated from SWMU 104. The vertical and horizontal extent of the plume must be determined.

Response Further interpretation of aerial photographs suggest that SWMU 104 does not exist where previously interpreted. Samples collected from Borehole BH7-87, drilled at the highest soil gas point near SWMU 104, contained no analytes at concentrations above background.

3.4 SWMU 105

Comment It is inconclusive, as pointed out, whether the source of contamination at BH4-87 was caused by migration of contaminants from SWMU 105 or from another source. The source, extent, and amount of contamination at BH4-87 must be investigated in more detail. The interrelationship of SWMU 105 and 107 should be referenced.

Response The relationship between SWMUs 105 and 107 is discussed in Section 4.6. The contamination at BH4-87 is addressed in Section 4.2.2. Additional boreholes were drilled in this area during the second phase of RI drilling, and sample results from those boreholes are incorporated into this discussion.

3.5 SWMU 106

Comment The size and location of the pond at the discharge site of the SMWU should be provided and the surface water sample results, given in Chapter 5, should be referenced

Response The outfall site (SWMU 106) consists of a cleanout pipe for an overflow line from the sewer line in Building 887 (Section 4.5) Surface water samples were not collected at the discharge site of SWMU 106

3.6 SWMU 107

Comment The dimensions and location of the skimming pond should be given and the results of the surface water sample, given in Chapter 5, should be referenced

Response The size and location of the skimming pond is provided in Figure 6-1 Outfall samples from SW-45 and SW-44 are discussed in Section 6.0

Comment A summary statement indicating the need for further investigation is lacking

Response Further investigations were needed, and additional soil samples were collected from boreholes in the vicinity of SWMU 107 during the second phase of RI drilling These data are incorporated into the final report

3 7 1 SWMU 119 1

Comment The electromagnetic anomaly southwest of the SWMU and the conductivity anomaly on the southern portion of the SWMU should be located and explained

Response These anomalies will be located and discussed

Comment TCE was found in six not five soil gas samples in and south of the SWMU PCE and TCE values were elevated along the northern boundary and to the north of the SWMU These elevated levels should be explained Are they due to migration of contaminants from SWMU 130 or do they indicate that SWMU 119 1 extends farther south than shown? Results of sampling from BH15-87 should be incorporated into this section

Response TCE was indeed found in six not five soil gas samples south of SWMU 119 1 Sampling results from BH15-87 are presented in Section 4 7 1 along with the extent of PCE and TCE contamination north of the SWMU

Comment The conclusion that PCE, TCE, and TCA are only present in groundwater at this location is not substantiated by data collected from only two boreholes on the west end of the SWMU. The basis for this conclusion is not clear

Response This conclusion has been reevaluated for the final RI report based on borehole samples collected during the two phases of drilling at this SWMU PCE, TCE and TCA were detected in soil samples as discussed in Section 4 7 1

3 7 2 SWMU 119 2

Comment Soil gas data indicate elevated levels of PCE at the north end of the SWMU 119 2 in addition to the elevated DCE and TCA readings reported (p 3-11)

Response PCE was detected in the soil gas north of SWMU 119 2, however, these values were not considered elevated in the draft RI report Soil gas PCE concentrations in the vicinity of SWMU 119 2 are discussed in Section 4 7 2

3 8 SWMU 130

Comment Explanation of the electromagnetic anomalies should be given

Response Electromagnetic anomalies will be discussed in the final report

Comment Elevated levels of PCE are present throughout the SWMU and one elevated sample of TCA is present at the southwest tip of the SWMU (Plate 3-3 and 3-4, respectively) This is not consistent with the second paragraph on page 3-18 which states that only one sampling location has elevated VOCs

Response PCE was detected in soil gas in the area encompassed by SWMU 130, and TCA was detected in soil gas at one location southeast of the SWMU The final report has been corrected appropriately

Comment The concentrations of bis(2-ethylhexyl)phthalate (800, 760, 1000 ppb) are similar to the concentrations in other SWMUs described and are therefore not several times less concentrated than other boreholes as stated (p 3-14) The

elevated concentrations of VOCs must be addressed. Migration of this contamination may be the cause of contamination found downgradient in BH13-87.

Response The concentrations of bis(2-ethylhexyl)phthalate found in samples from SWMU 130 are similar to those found at other SWMUs in the 881 Hillside Area. Based on the data collected, soils at SWMU 130 may be contaminated with bis(2-ethylhexyl)phthalate.

3.9 SWMU 145

Comment Soil gas results show elevated concentrations for PCE south and downgradient of the SWMU. This does not support the stated conclusion that results did not indicate elevated levels of VOCs and therefore the SWMU is not an environmental threat (p. 3-15). Is it possible that contamination migrated from the SWMU and mixed with contamination from SWMUs 106 and 107? Further investigations around the SWMU should be conducted to explain the elevated values.

Response There is no evidence for the presence of SWMU 145 as discussed in Section 2.2.1, therefore, SWMU 145 was not discussed in Section 4.0.

3.10 SWMU 177

Comment This SWMU is not indicated on the map. Because the site was not used for waste disposal, does not preclude it from being a possible source of contamination. Has the possibility been explored that the soil under the building was contaminated by an unknown event, especially if the drums were stored directly on soil in the past? SWMUs 103, 106, and 107 partly cover the SWMU. The remaining area should be investigated further.

Response SWMU 177 is not shown on Plate 3-1 as it is undergoing RCRA closure under interim status. Thus, this unit will not be included in the final RI report.

3.11 Summary

Comment SWMUs 102, 105, 145, and 177 are not considered as sources of surface water or groundwater contamination. However, information provided by the report indicates otherwise. Further investigation of these SWMUs must be completed before each of these can be discarded as an environmental problem.

Response Further investigations were conducted in the vicinity of these SWMUs. Results of these studies will be incorporated into the final RI report, and the sources of contamination on the 881 Hillside will be reevaluated based on these data.

Comment The extent of the contamination from SWMUs 103, 106, 107, 119, 104, and 130 must be well defined through more detailed studies.

Response Additional boreholes and wells were drilled at the 881 Hillside subsequent to submittal of the draft 881 Hillside RI Report and discussions with CDH and EPA. Results of these studies will be provided in the final RI report, and the extent of contamination at the hillside will be reevaluated based on these data.

Comment In addition to bis(2-ethylhexyl)phthalate, PCE and TCE are contaminants of the 881 Hillside. From the data presented, it appears that radionuclides are also present.

Response The contaminants of concern at the 881 Hillside will be identified in the final RI report based on data collected during the initial RI drilling program and the second phase of drilling

CHAPTER 4 - GROUNDWATER

4.1 Soils/Alluvial Materials

Comment As noted in section 2.6.2, the different stratigraphic layers in the surficial deposits must be described. The hydrology of the different layers underlying the SWMUs must be investigated in greater detail.

Response The stratigraphy, lithology, and hydrologic characteristics of surficial deposits underlying the 881 Hillside are addressed in detail in the Section 5.4.2 of the final RI report.

Comment The dates for the tests listed in Table 4-1 should be given.

Response Data, results, and analyses of hydraulic tests are presented in the Hydrogeologic Data appendix (Appendix E) including test dates.

4.2 Bedrock Materials

Comment The elevations at which the sandstone lenses occur should be mentioned.

Response Elevations at which sandstones occur will vary depending on the borehole's position along strike and dip and thus are not considered particularly critical pieces of data for this report. The extent and continuity of the sandstones will be discussed in Section 5.4.2 of the final report.

4.3 Groundwater Flow

Comment Areas of recharge and discharge for each geologic unit referred to in 4.3.1 should be shown on the geologic map with specific reference to the SWMU locations

Response Areas of recharge and discharge are best shown on the potentiometric surface map to show the relationship between recharge, flow directions, and discharge. Recharge and discharge areas are addressed in Section 5.4.2 of the final report, and SWMU locations will be shown on plates in Section 5.0 for easier reference.

Comment The seasonal changes in flow velocities must be examined to determine possible effects on hydrology and contaminant migration.

Response Since new wells at the 881 Hillside were drilled only a few weeks prior to submittal of the draft 881 Hillside RI Report, seasonal data were not yet available for these wells. Seasonal water level data for 1986 and 1987 wells are provided. Three potentiometric surface maps are provided to exhibit seasonal water levels (Plates 5-4, 5-5, and 5-6).

4.4 Groundwater Contamination

Comment Detailed geologic cross sections showing the stratigraphic units, structure, boreholes, wells, and extent of contamination underlying each SWMU are necessary.

Response Additional detailed geologic cross sections are provided in the final RI report as Plates 5-2, 5-3, and 5-4. The extent of contamination underlying each SWMU is discussed in Section 5.4.2.

Comment The discussion on SWMUs 106 and 107 indicates that radionuclides are mobile in groundwater. Because this directly affects the extent of contamination, further explanation is required.

Response The radionuclide concentrations presented in section 4.4.1 were reevaluated in terms of background alluvial ground-water quality and are further explained in Section 5.4.2..

Comment The elevated strontium values given for SWMU 119.1 are not listed in Chapter 3. The section describing SWMU 119.2 refers to the southwest flow of groundwater. This is not illustrated on the potentiometric map (Plate 4-1).

Response Chapter 4 presents waste source characterization, and Chapter 5 discusses the nature and extent of ground-water contamination. The elevated strontium levels were found in ground water and are thus discussed in Chapter 5.

The direction of flow from 119.2 would be south-southwest if the colluvium was saturated. However, the colluvium was unsaturated at the time of writing the draft RI report. Plates 5-4, 5-5 and 5-6 depict groundwater flow directions.

4.5 Conclusion

Comment Well 65-86 is not shown on the map and analytical data is not given for this well.

Response Well 65-86 will be shown on the appropriate figure or plate, and analytical data will be provided

General Comments

Comment Information from the plates can be consolidated Soil gas maps should show the SWMU boundaries Levels of contaminant concentrations could be outlined to better characterize the plumes

Response SWMU, monitor well, and borehole locations will be shown on revised soil gas maps

Comment. All cross sections must be constructed without vertical exaggeration Several detailed cross sections are needed The zones of contamination should be illustrated in plan and cross section to show the vertical and horizontal configuration of the plumes

Response Cross sections will be constructed without vertical exaggeration, and additional cross sections will be provided Zones of contamination will be shown on cross sections where sufficient data are available

Comment Table 4-2 should include background values for each of the contaminants listed and an explanation of the symbols (i.e. 130+/-17) used.

Response The discussion on background ground-water quality is being revised as is Table 5-9 Table 5-9 will show background values for every analyte for which data are available

Comment The hydraulic conductivity and interconnection under each SWMU must be described

Response The hydraulic conductivity of the various units underlying the 881 Hillside and their interconnection are discussed in Section 5.3

Comment The potentiometric surface should be defined to Woman Creek. A potentiometric surface map should be constructed for each season to illustrate any variation in groundwater flow

Response The potentiometric surface map will be extended down to Woman Creek. For the final RI report, water level data are available for late summer, fall, and winter, 1987. Additional potentiometric surface maps will be constructed for the final RI report, however, water levels for the wettest period of the year (spring and early summer) will not be available for the March 1, 1988 deliverable

Comment An explanation for ending the soil gas survey at the interceptor ditch is necessary. It is indicated in CEARP Phase II, Plate II, that the survey extends farther south to Woman Creek

Response An explanation of the soil gas survey will be provided in the soil gas survey appendix of the final report

Comment The chemical and physical interaction of the contaminants and the matrix must be addressed

Response To the extent possible, the chemical and physical interaction of the contaminants and the matrix is addressed in Section 5.4.2

Comment A sampling schedule must be submitted.

Response This comment presumably refers to ground-water sampling schedules. Such schedules have already been submitted to CDH and EPA in the form of the RI Work Plan.

Comment QA/QC is deficient. Possible methylene chloride contamination in the lab has caused uncertainty of some results. The radiochemistry data is conflicting for SMWU 1192.

Response QA/QC is being reevaluated for the final RI report. This includes an analysis of laboratory methylene chloride contamination, and corrected radiochemical data for all samples.

Comment It is indicated that several of the SWMUs need further investigation before definitive conclusions can be made as to the nature and extent of the contamination. In light of this, the report is considered preliminary. The final RI should be a detailed report on the contamination at each SWMU.

Response This final RI draft report contains results from additional drilling performed at the 881 Hillside and contains the detail necessary to define contamination in the area.

CHAPTER 5 - SURFACE WATER

Comment A figure, drawn to scale, showing the location of all the features mentioned plus those of the ponds at SWMUS 106 and 107, would be helpful. The South Interceptor Ditch extends from the old landfill. Explain what effects the old landfill has on the water quality in the Interceptor Ditch.

Response Plate 6-1 shows the locations of all site features mentioned. The pond at SWMU 106 is at surface water station SW-46, and the pond at SWMU 107 is at surface water stations SW-44 and SW-45. These stations are shown on Plate 6-1. The old landfill will be identified on the revised plate. The effects of the old landfill (or other source in this vicinity) on water quality of the South Interceptor Ditch are discussed on page 6-10.

Comment The radionuclides and other parameters sampled and their maximum allowable values under the NPDES permit should be tabulated. Would this list be the same as Table 5-1?

Response The parameters analyzed in water samples from NPDES discharge points are shown in Table A-1 (Attached). Radionuclides are analyzed although not required by the NPDES permit.

5.1.1 Surface Water Flow

Comment The reason for not measuring flow rates in May 1987 should be given. The variation in seasonal flow must be addressed.

Response The seasonal variation of surface water flow cannot be addressed with the present data Flow rates were not measured after August 1986

512 Surface Water Chemistry

Comment Values for total dissolved solids are not shown Were samples analyzed for DCE?

Response Total dissolved solids data will be presented in the revised report All samples were analyzed for DCE as shown in Table 6-3

South Interceptor Ditch

Comment The source of the contamination detected in SW-37 (Building 460?) and SW-36 (old landfill?) must be addressed In general, the upstream samples show contamination How does this affect the water quality downstream?

Response Surface water station SW-37 was dry during the 1986 and 1987 sampling periods The occurrence of contamination at SW-36 will be reevaluated in the revised report

Comment The impact of SW-44 on the Interceptor Ditch is that it effectively drains the upgradient contamination emanating from SWMUs 103, 106, 107, and possibly 177 and does contain elevated concentrations of radionuclides and 4 ppb PCE.

Response The impact of the discharge at SW-44 on the South Interceptor Ditch (SW-31) will be discussed in the revised report Radionuclide concentrations in the discharge at SW-44 are being reevaluated

Comment As noted in the description of SW-27, the concentrations of contaminants are for two different times of the year and the data may reflect temporal changes. If temporal changes will cause large variations in contaminant concentrations, then only the contaminant concentrations measured at the same time of year in up- and downstream stations should be compared. In addition, the effects of and potential for dilution and attenuation of concentrations should be addressed.

Even though the occurrence of the HSL compounds was isolated at SW-27, the significance of their occurrence must be addressed.

Response Limited data were available at the time of writing the draft RI report. Additional data collected since that time will be evaluated and incorporated into the final report. The revised report will discuss, to the extent possible, temporal changes, any dilution or attenuation effects, and the significance of the HSL organics detected at SW-27.

Woman Creek

Comment The description of SW-33 indicates that there are no data on metals and major ions. Were the samples analyzed for these?

Response Table 5-2 erroneously reports some volatile organic and radionuclide data for the August, 1986 sampling of SW-33. This station was actually dry at that time, and the table will be corrected.

Comment The increase in radionuclides at SW-32, downstream of SW-33 and SW-34, may be due to water flowing directly south from the 881 Hillside and discharging into Woman Creek. The uncertainty for the increase must be addressed.

Response Any impacts of the 881 Hillside on water quality in Woman Creek at SW-32 will be addressed in the revised report

Comment The last paragraph stated that there is no indication of a contaminant release in samples from SW-29, SW-28, and Pond C-1 Show how the data support this

Response The statement refers to the lower concentrations of radionuclides at these stations relative to the concentrations at SW-32 The final report will incorporate additional data to better assess any contaminant releases to Woman Creek

521 Background Sediment Chemistry

Comment The background concentrations of all parameters in sediments must be provided

Response Available background soil/sediment data will be provided

522 Downgradient Sediment Chemistry

Comment The location of the East Trenches and 903 Pad Area should be shown for reference since they are mentioned as the likely sources for the increase in radionuclides in the downstream sediments

Response A figure will be provided in the revised report showing the locations of the East Trenches and 903 Pad Areas

5 3 FLOOD POTENTIAL

Comment Figure 5-1 is basically illegible and too small a scale

Response The quality of Figure 5-1 will be improved for the final report

CHAPTER 6 - AIR

Comment The chapter describes the air monitoring program used at the facility. Specifically how the program applies to the 881 Hillside must be addressed. It is possible that contamination from wind dispersal of contaminated soil is widespread throughout the general area. Locations of contaminated soil which are subject to redistribution via the air pathway must be identified. Areas contaminated as a result of wind-blown contaminated soil must also be identified.

Response This chapter will be revised to specifically address how the Plant-wide air monitoring program applies to investigations at the 881 Hillside Area.

6.1.1 Ambient Air Sampling for Radionuclides

Comment The effectiveness of the existing monitoring stations for detecting airborne contaminants from the 881 Hillside must be presented to support the conclusions. The necessary documentation is absent. The geographic relationship between 881 Hillside, SWMUs, and relevant monitoring stations must be illustrated at an appropriate scale. The summary of the monitoring program findings over the last 10 years might provide the basis for evaluating contamination problems related to the 881 Hillside. A table showing the sample data, location and date, parameter standards, and other pertinent information is necessary (this applies to the entire chapter). The sample results could also be presented graphically.

Response As stated above, this chapter will be revised to specifically address ambient air sampling for radionuclides at the 881 Hillside. Necessary data will be provided to support conclusions.

Comment Rationale for certain procedures should be provided For example, on what is the "Plant Screening Guide" for analyzing filters of 0.01 pCi per cubic meter of total long-lived alpha and plutonium activity based? Why are only long-lived alpha and plutonium activity tested?

Response The Plant Screening Guide for analysis of Total Long Lived (TLL) Alpha is based on the DOE Derived Concentration Guide (DCG) for inhalation of Class W plutonium by the public. Since plutonium is an alpha particle emitter, filters are first analyzed for TLL. If a sample exceeds the TLL, then it is analyzed for plutonium. This procedure reduces the work load and expense of analytical laboratories while protecting human health and the environment. Filters are only analyzed for plutonium, as it has historically been the radionuclide contaminant of concern at the Plant. Rationale of the air sampling programs will be provided in the final report.

Comment Analyses of the five samplers located near the solar evaporation ponds and 903 Pad areas (p. 6-2) are compared to the DCG for inhalation of Class W and Class Y plutonium. In order to make the comparison, the plutonium concentrations in the samplers and the DCG value must be provided. Again, it is important to explain the connection between these samplers and the 881 Hillside.

Response This discussion will be reevaluated and revised accordingly to address air contamination resulting from the 881 Hillside.

Comment No supporting information is given backing the statement that most plutonium released will be Class Y lung clearance category, with consequent lesser dose. Without providing the analytical data, the reader cannot determine that the mean annual plutonium levels since 1977 were less than the DCG. Were the levels

higher than the DCG prior to 1977? Although the results of the RAAMP samples are in the monthly reports, the data pertinent to the discussion is needed to provide a basis for analysis

Response Section 6.1.1 states that the mean annual plutonium levels have been less than 3 percent of the DCG since 1977 for the five samplers analyzed biweekly for plutonium. Since their installation, all onsite samplers have recorded mean annual plutonium concentrations less than seven percent of the DCG, and all perimeter and off-site samplers have recorded mean annual plutonium concentrations below 0.4 percent of the DCG. Data will be provided in the final report to support these conclusions.

Comment Terminology must be defined. What indicates an anomaly or a trend? Is there an established baseline to which anomalies, values, or trends can be compared?

Response Terminology will be defined and baselines will be defined in the final RI report.

6.1.2 Routine Nonradioactive Ambient Air Monitoring

Comment The location of the sample stations for which non-rad constituents are monitored should be given. The presence of VOCs in groundwater and surface water at the 881 Hillside, suggests that VOCs should also be monitored.

Response The location of the nonradioactive ambient air monitoring station will be provided. A discussion on volatile organic compound monitoring at the 881 Hillside is presented in Section 7.2.2.

Comment Can contaminants from the 881 Hillside be detected at the existing sample locations or are additional sampler, appropriately located along the 881 Hillside, necessary?

Response Site specific nonradioactive air monitoring was performed at the 881 Hillside as part of remedial investigation field activities. In addition, RAAMP stations downwind of the 881 Hillside Area effectively monitor the 881 Hillside Area.

6.1.3 Special Dust Resuspension Studies

Comment The background values of plutonium referred to in the text must be given.

Response No true background exists for plutonium, as it is a manmade element. However, plutonium is found worldwide in extremely low concentrations due to atmospheric testing of nuclear weapons and the consequent fallout of plutonium from the atmosphere. The background level of plutonium near Rocky Flats Plant was estimated in a Colorado State University study to be less than 0.045 picoCuries per gram (less than 0.1 dgm/g) (Whicker, 1979).

Comment This section pertains to a study concerning the 903 Pad Area. How does the research relate to the 881 Hillside? It is important to address resuspension of the soils, etc., present on the 881 Hillside (are they the same as at the 903 Pad Area?) Is the 881 Hillside effected by contamination from the 903 Pad Area? This may be important in determining the methods of remediation at each site and the order of remediation for all the sites.

Response This section will be revised to explain the relationship between resuspension studies and air quality at the 881 Hillside. The effects (if any) of dust resuspension from the 903 Pad Area on the 881 Hillside Area will also be addressed.

Comment It is noted that plutonium dispersal was possible via dust resuspension from 30-35 mph winds and that dust resuspension significantly increased from high velocity winds (p 6-7). The interpretation of the data leading to the conclusion that the potential for contaminant exposure by dust is low, does not account for the high winds which are common in this area (p 2-16). The study should also address the transportability of volatiles and other contaminants.

Response Over a seven year period of dust resuspension studies at the Plant, only two instances were identified in which resuspension was clearly affected by wind speed. Thus, the basis for the conclusion that the potential potential for exposure by resuspended dust is low, does include data for high winds which are common to the area.

Comment The term "fallout levels" must be defined.

Response "Fallout levels" will be defined as stated above.

6.2 Remedial Investigation Air Sampling Results

6.2.1 Radiometric Survey

Comment The term "background level" must be defined. Analytical results of the survey should be presented and include the alpha, beta, and gamma activities, sample locations, and expected source. Indicate on a map at the appropriate scale, the

area of the radiometric survey and the four areas with gamma radiation above background

Response The radiometric survey of the 881 Hillside was performed using a Field Instrument for Detecting Low Energy Radiation (FIDLER) Background as used in section 7.2.1 is 250 cpm of gamma activities This instrument does not measure alpha or beta radiation Analytical results for this survey are not available

Comment Address whether or not the radionuclide contamination is site specific or dispersed across the 881 Hillside Based on the information provided, it is not conclusive that radioactive contamination of air and airborne particles is not an environmental problem

Response Radionuclide contamination at the 881 Hillside is limited to small specific sites, which do not pose an environmental problem This comment will be further addressed in the final report

Comment Dispersion meteorology and air flow patterns at Rocky Flats are discussed in the Environmental Impact Study (1980, Appendix B) and CEARP Phase I (p III-2) Data that supports the conclusions presented for the 881 Hillside contained in those reports should be included in the RI

Response Plutonium concentration data for on-site, perimeter and community RAAMP air samplers have been included in Appendix I, and have been interpreted in Section 7.0

6 2 2 Volatile Organic Compound Survey

Comment Bis(2-ethylhexyl)phthalate was cited as the primary contaminant on the 881 Hillside (p 3-16) This is not consistent with that stated in the first paragraph that PCE and TCE were the most commonly found contaminants and had the highest concentrations (See comments on Section 3 11) Toxicity of contaminants must be taken into account along with the concentrations

Response Section 6 2 2 states that prior to March, 1987 remedial investigation field activities PCE and TCE were the most commonly found contaminants at the 881 Hillside Bis(2-ethylhexyl)phthalate was identified as the primary soil contaminant subsequent to remedial investigation field activities These conclusions are being reevaluated based on the second phase of field work and will be clarified in the final report The toxicity of contaminants will be addressed in the 881 Hillside Feasibility Study, March 1988

Comment A map, at an appropriate scale, showing the area surveyed, sample points, and SWMU outlines, is necessary to gain an understanding of the sources, nature, and extent of contamination

Response The Rocky Flats Plant coordinates of the sample locations are presented in Table 6-1 A map showing the sample locations is not considered necessary since volatile organics were detected at only two sampling locations Rocky Flats Plant coordinates are shown on all of the 881 Hillside maps

Comment Detection limit concentrations and standards are not provided in Table 6-1 and are necessary to evaluate the data

Response The detection limit for for both PCE and TCE concentrations presented in Table 6-1 is approximately 1 part per million Detection limits and standards will be provided in the final report

Comment The conclusion that soil gas contamination is not migrating is not supported The conclusion is based on analysis of samples from Woman Creek It is possible that the plume of contamination does not extend to Woman Creek The migration distance must be defined in order to characterize the nature and extent of contamination

Response Section 6 2 2 states that soil gas sampling indicates limited areas of detectable volatile organics in soil gas, and that this contamination has not migrated off the 881 Hillside based on the 1986 soil gas data Soil gas contamination has apparently migrated downslope However, the high concentrations of volatiles near the SWMUs appear bracketed by areas where volatiles are undetected in the soil gas

Comment Minimal must be defined What are the effects of the volatile organics released to ambient air on human health and the environment?

Response Volatile organics were undetected in ambient air upgradient and downgradient of the 881 Hillside during remedial investigation activities Therefore, there are no effects on human health and the environment via the air pathway This will be clarified in the revised report

CHAPTER 7 - BIOTA

7.1 FLORA

Comment One purpose of the vegetation sampling is to help determine the nature and extent of contamination. Therefore, it is important to show the locations of the sampled areas and SWMUs and to provide the analytical results and background values. Information relevant to determining the nature and extent of the contamination along the 881 Hillside should be outlined. Graphical illustration such as a contour map of radionuclide concentrations may be helpful in evaluating the data.

Response Vegetative sampling was not conducted at the 881 Hillside because the radiometric survey indicated less than 50 square feet of the entire area at the 881 Hillside had above background gamma activity, and there are no signs of vegetative stress at the 881 Hillside. On this basis, and because radionuclides in soils at the 881 Hillside are at or near background levels (they are elevated near the 903 pad where vegetative sampling has been conducted), vegetative sampling and analysis was not conducted at the 881 Hillside for inclusion in the revised report.

Comment The second paragraph on page 7-3 states that hazardous constituents have not been found in soils at the 881 Hillside. This is contrary to the soil gas studies presented in Chapter 3. In addition, the last paragraph indicates that areas of erosion and slumping are present. These areas and their effect on site-specific hydrology and hence contaminant migration were not delineated in the geologic and hydrologic sections. Consistency must be maintained throughout the RI. (See comments on Section 2.6.2.)

Response Previous and additional data will be evaluated in the revised report to determine the presence of soil contamination (Section 4, and the influence of erosion and slumping, if any, on hydrology (Section 5)

Comment This section does not address or provide information that would help characterize the nature and extent of the contaminant plumes on the 881 Hillside

Response This section is not intended to provide information on plumes

72 WILDLIFE

Comment As noted in Section 71, hazardous constituents are present in shallow soils. The opposite is stated in this section (p 7-5)

The section should also use the results of past investigations to help determine the extent of contamination along the 881 Hillside

The radionuclide data for the report is preliminary. Therefore, the statement that plutonium has not been found (p 7-6) is not supported

Response Additional historical data and new data will be evaluated in the revised report to better characterize the nature and extent of soil contamination as discussed in Sections 40 and 50. The relationship between soil contamination and wildlife is presented in Section 80

73 AQUATIC LIFE

Comment The first paragraph states that Woman Creek received cooling tower blowdown and water treatment plant filter backwash discharge. This is not directly stated in Chapter 5. The possible contribution of these past discharges to the on- and off-site contamination must be addressed.

Response The chemical data collected for the RI will be used to establish if there is a contaminant release to Woman Creek from the 881 Hillside or other source. However, unless the data indicate significant above background levels of chemical constituents upstream of the 881 Hillside (e.g. U-238 at SW-36 on the South Interceptor Ditch near the Old Landfill), the evaluation will focus on potential releases from the subject site only.

CHAPTER 8 - PUBLIC HEALTH AND ENVIRONMENTAL CONCERNS

Comment The Feasibility Study for the 881 Hillside will address, in more detail, the concerns presented in this chapter. The following review provides some initial comments.

Consistency in information is lacking. The second paragraph states that radiochemical data was unavailable at the time of the writing. However, radionuclide concentrations are given at the end of the paragraph. The concentrations of all the contaminants given in the paragraph should be referenced to the appropriate table.

Response The unavailable radionuclide data is in reference to the soils. The paragraph will be entirely rewritten to provide a more clear discussion.

8.1 POTENTIAL RECEPTORS

8.1.1 Direct Source Contact Potential Receptors

Comment In general, it is not sufficient to argue that exposure to contaminants is not possible because the area is in a restricted zone. This also pertains to Section 8.2.1.

Response The risk assessment in the Feasibility Study provides a direct source contact exposure scenario. The revised text for Section 9.0 will make reference to this information.

8 1 2 Potential Receptors of Contaminated Air

Comment The first sentence is unclear The necessary documentation that supports plume dilution is not given or referenced The data source from which the wind rose was determined should be referenced

Response The subsection's purpose is only to discuss potential receptors of contaminated air, and plume dilution is simply mentioned as a matter of fact pertaining to air transport of contamination The data source for the wind rose is referenced in Section 7

8 1 3 Potential Receptors of Contaminated Ground Water

Comment The frequency of domestic well use and amount of water withdrawn where pertinent to contaminant migration from the 881 Hillside should be given This section discusses location of wells but does not address the potential of contaminants occurring in the wells

Response A discussion of contaminant migration rates will be provided in the revised report A preliminary analysis of these rates appears to indicate drawdown at the domestic wells will not influence contaminant migration rates

8 1 4 Potential Receptors of Contaminated Surface Water

Comment This section should include a discussion on Mower Reservoir as it also accepts flow from Woman Creek (Figure 2-3)

Response The Mower Reservoir is in the Woman Creek drainage but only receives flow from a smaller subdrainage located just north of the main stem of the Woman Creek near the property boundary The subdrainage surface waters flows would not be impacted by the 881 Hillside Area

8.2 PUBLIC HEALTH IMPACTS

Comment The comments presented for Chapter 6 should be taken into account in this section This section does not address what the exposure potential is or what the potential health effects are to receptors of low levels of ambient radioactivity on resuspended dust particles

Response Section 7 will be revised to address these previous comments and Section 9.2 will be revised to summarize the findings presented in Section 7

8.2.3 Exposure to Contaminated Groundwater

Comment The exposure potential and associated health concerns related to groundwater contamination are not fully addressed The text states that contaminated groundwater surfaces and discharges into Woman Creek but that surface waters are "clean" downstream of the 881 Hillside A detailed analysis tracking the path and contaminant concentrations in the contaminated water and the associated health and environment effects of the contamination must be provided The term "clean" must be defined

Response This section will be revised to more fully address the relationship between ground-water contamination and exposure potential

8.2.4 Exposure to Contaminated Surface Water

Comment The comments concerning surface water presented in Section 8.2.3 must be addressed

Response The relationship between ground water, surface water, and the potential for exposure will be addressed in the final report

Comment The nine samples mentioned should be referenced back to Chapter 5 or listed. The SWMU associated with the contamination at SW-45 must be given. The flow time, flow rate, and contaminant concentrations of the footing-drain discharge may change seasonally.

Response Chapter 6 will be referenced in the surface water sampling discussions. Further investigations were performed in the vicinity of the foundation drain to evaluate its relationship to ground-water flow in the vicinity of SWMU 105, 106, and 107. Results of this study will be provided in the final report.

Comment Seasonal variation and possible effects on remediation must be considered for complete evaluation of the SWMU. August 1986 and May 1987 sample data for SW 32 indicate seasonal effects.

Response Seasonal effects on surface water flow and quality will be evaluated to the extent possible.

Comment From the discussion, it appears that the old landfill is a potential contaminant source at the 881 Hillside and should be taken into account under the

current investigation Reference to future remediation of the old landfill should be made

Response The old landfill is not located on the 881 Hillside and is not a high priority site Remedial investigations at the low priority sites (including the old landfill) are scheduled to begin during the spring of 1988

8.3 Environmental Impacts

Comment Radionuclide data from nine soil samples (p 3-1) were not available at the time of the writing Therefore, the conclusions made concerning contaminated soils are not substantiated Even though biodegradation and volatilization of bis(2-ethylhexyl)phthalate has occurred, analytical results show that the compound is still present

Response The impacts of the 881 Hillside on human health and the environment will be reevaluated based on complete laboratory data from the first and second phases of remedial investigation field activity

Comment It is not sufficient to state that the intended land use precludes any potential environmental impacts caused by contamination on the facility

Response The Risk assessment in 881 Hillside Area Feasibility Study documents risks to the public that may be posed should there be uncontrolled access to the 881 Hillside Area

APPENDIX A
REPORT OF GEOPHYSICAL INVESTIGATIONS
881 HILLSIDE AREA

Comment Based on the bedrock and shallow well pair 59-86 and 69-86, it was determined that the water level in the sandstone is 18 feet lower than that in the surficial material. This is not consistent with Figure 4-1 (p 4-8)

Response Figure 4-1 is correct. The statement on page A-2 of the geophysical investigation report will be revised.

3.2 Electromagnetic Conductivity and 3.3 Resistivity

Comment It would be helpful in interpreting the significance of the survey results if the SWMU locations and geology were superimposed onto the horizontal and vertical dipole plots provided.

Response The geophysics report was prepared prior to other surveys and drilling programs at the 881 Hillside. Thus, results of those studies were not incorporated into this report. Results of the geophysical report will be incorporated into the SWMU and geology sections of the final report.

Section 5. Survey Results

Comment It is confusing to have Appendices A, B, and C in Appendix A.

Response Appendices will be renamed to avoid confusion.

5.1 Electromagnetic Conductivity

Comment Define anomaly

Response Anomaly will be defined

5.2 Resistivity

Comment The information obtained from the survey should be incorporated with data obtained from the other surveys and subsurface drilling to characterize, in detail, the hydrology and effect on contaminant migration from each SWMU

Response Results of the geophysical surveys will be incorporated with other data in the main text of the final RI report

5.3 Magnetometry

Comment The anomalous areas discussed in the text should be labeled on the plot of magnetometer data. It appears that more than two anomalous areas are present

Response The discussion of magnetic anomalies will be clarified, and appropriate figures will be provided

Comment Detailed information must be provided regarding the four locations where magnetic and conductivity anomalies overlap possibly indicating "large concentrations of metallic objects which have been deposited on the site" (p A-23)

Response This statement will be reevaluated, and more detail will be provided

Section 6. Conclusions

Comment The cause of anomalous values obtained near SWMUs 106, 107, and 130 must be investigated to fully assess the nature and extent of contamination along the 881 Hillside

Response Geophysical anomalies were investigated during the drilling program Results of drilling and sampling are presented in Chapters 3 and 4 of the RI text

APPENDIX B
SOIL GAS SURVEY

1.0: Introduction

Comment The objective of the 881 Hillside report, as stated in this section, was in part to determine the presence and concentrations of carbon tetrachloride. Soil gas analyses of carbon tetrachloride are not provided. If carbon tetrachloride is expected as a contaminant at the 881 Hillside, then analyses should be done. A justification for not performing the analyses is needed otherwise.

Response Soil gas samples were analyzed for carbon tetrachloride. No carbon tetrachloride molecular counts were detected.

2.4: Plume Map

Comment Data can be contoured to better illustrate the extent of the plumes.

Response Soil gas data were not contoured because of the large range of values.

APPENDIX C
DESCRIPTION OF DRILLING ACTIVITIES

2.1. Borehole Locations

Comment BH4-87 is the closest borehole to SWMU 105

Response This will be noted in the revised report

Comment The concentrations of TCA and DCE at soil gas point 92 were also high. No boreholes are south (downgradient) of SWMu 1192 where TCE and PCE were detected in soil gas sampling

Response. Additional boreholes were drilled south of SWMU 1192 during the second drilling phase

2.2. Monitor Well Location

Comment Is the swale where wells 1-82, 2-82, and 6-87 are located, a local discharge area? What effect does this have on contaminant migration? Recharge and discharge areas need to be shown

Response Recharge and discharge conditions will be discussed in the Site Hydrogeology section of the revised report. This section provides rationale for the drilling program

3.1. Volatile Organic Field Screening Procedures

Comment A reason for the change in sampling procedure at BH12-87 and BH14-87 should be given

Response All rationale for sampling procedures are provided in Appendix D

APPENDIX D
HYDROGEOLOGIC DATA

Comment Some of the well summary data sheets, log-boring data sheets, and aquifer-test data sheets are hand-written copies and are illegible

Response Legible copies of the data sheets are provided in Appendix E

APPENDIX E
ANALYTICAL CHEMISTRY RESULTS

Comment A table of contents and introduction are necessary to explain the organization of the data. Detection limits must be provided (or referenced) for data comparison.

Response Appendix F containing the analytical chemistry results have been reorganized and indexed for easier reference. Detection limits are provided.

Comment Some of the data sheets are not legible.

Response Legible data sheets are provided.

Comment Data sheets contain results of the different media (soil and water) sampled. The background concentrations of the potential contaminants in all of the media (surface water, ground water, and each geologic unit) should be established so that elevated concentrations can be distinguished. Organization and graphical display of the data can show where significant trends and elevated concentrations exist which help determine the nature and extent of contamination.

Response An analysis of background conditions for soils, surface water, alluvial and bedrock ground water are presented in Section 40, 50, 60.

APPENDIX F
QUALITY ASSURANCE

1.3. Laboratory Quality Assurance

Comment QA/QC procedures are not explained in Appendix E or F The problems encountered in analytical procedures and the effect on the results must be addressed to determine the validity of the data An explanation should be provided for changes in the laboratory performing the analyses and what effect this may have on precision and accuracy

Response QA/QC procedures and laboratory selection are explained in Appendix G

1.5. Soil Gas QA

Comment Table F-2 requires an explanation and map showing the sample locations Also, it is not clear if duplicates were taken for all VOCs or only for PCE and TCE

Response A sample location map is provided in Plate 4-2 Duplicates were analyzed for the same parameters as routine samples Only those parameters detected were reported in Table G-3